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10/078,020	02/15/2002	Won K. Choi	END920020007US1	4945 (
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IBM Corporation			ZIMMERMAN, JOHN J	
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Endicott, NY 13760			1775	
		•	DATE MAILED: 10/02/2003	DATE MAILED: 10/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Application No. Applicant(s) CHOI ET AL	v .			
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FIRST OFFICE ACTION

Information Disclosure Statement

1. The information disclosure statements received February 15, 2002 and April 8, 2002 have been considered. Initialed forms PTO-1449 are enclosed with this Office Action.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

- (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
- (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
- (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
- (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

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- 3. Claims 1-8, 29-35, 69 and 76-79 are rejected under 35 U.S.C. 102(b) as being anticipated by Sakai (U.S. Patent 6,077,477).
- 4. Sakai discloses a lead-free solder alloy containing 92-97 wt.% Sn, 3.0-6.0 wt.% Ag and 0.1-2.0 wt.% Cu wherein the solder is solidified at a temperature gradient of 5°C./sec to 15°C./sec (e.g. see column 2, lines 20-30, 41-52). The cooling rate of Sakai would meet the conditions of the applicant's claims. Patent and Trademark Office can require applicants to prove that prior art products do not necessarily or inherently possess characteristics of claimed products where claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes; burden of proof is on applicants where rejection based on inherency under 35 U.S.C. § 102 or on prima facie obviousness under 35 U.S.C. § 103, jointly or alternatively, and Patent and Trademark Office's inability to manufacture products or to obtain and compare prior art products evidences fairness of this rejection, *In re Best, Bolton, and Shaw,* 195 USPQ 431 (CCPA 1977). The amounts of Ag and Cu in the solder are taught by Sakai with sufficient specificity as to anticipate the rejected claims. See MPEP 2131.03.
- 5. Claims 1-6, 9-15, 17-21, 29-30, 32-33, 36-38, 40, 42-43, 45, 50-54, 56-61, 69-71 and 73-77 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka (Japanese publication 2001-138088).

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6. Tanaka discloses a lead-free solder alloy containing Sn, 2.6 wt.% Ag and 0.6 wt.% Cu (e.g. see paragraph [0024]). The silver content in the alloy is low enough to suppress formation of Ag₃Sn plates regardless of the cooling rate. Patent and Trademark Office can require applicants to prove that prior art products do not necessarily or inherently possess characteristics of claimed products where claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes; burden of proof is on applicants where rejection based on inherency under 35 U.S.C. § 102 or on prima facie obviousness under 35 U.S.C. § 103, jointly or alternatively, and Patent and Trademark Office's inability to manufacture products or to obtain and compare prior art products evidences fairness of this rejection, *In re Best, Bolton, and Shaw*, 195 USPQ 431 (CCPA 1977). The amounts of Ag and Cu in the solder are taught by Tanaka with sufficient specificity as to anticipate the rejected claims. See MPEP 2131.03.

Claim Rejections - 35 USC § 103

- 7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:
 - (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
- 8. Claims 11-17, 20-28, 36-56, 59-68 and 70-73 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's disclosure of the prior art in view of Sakai (U.S. Patent 6,077,477).

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Applicant discloses that chip carriers in the prior art may be coupled to a circuit card by a 9. ball grid array comprising BGA solder balls and that lead-free solders are now beginning to be used commercially. Applicant discloses, however, that the lead-free solders have adverse physical characteristics which may cause reliability problems and that there is a need for a reliable lead-free solder for use in solder ball and chip or chip carrier assemblies (e.g. see applicant's specification page 1, lines 6-14). Therefore, there is established a motivation to find an acceptable and reliable lead-free solder for electronic assemblies in the prior art. To this end, Sakai discloses a lead-free solder alloy containing 92-97 wt.% Sn, 3.0-6.0 wt.% Ag and 0.1-2.0 wt.% Cu which is solidified at a temperature gradient of 5°C./sec to 15°C./sec (e.g. see column 2, lines 20-30, 41-52) so that excellent mechanical strength and thermal fatigue resistance can be achieved. The cooling rate of the solder of Sakai would meet the conditions of the applicant's claims. Sakai also discloses that his invention may be used in electronic circuit boards mounting electronic components (e.g. see column 1, lines 14-23). In view of Sakai's disclosure that his lead-free solder composition has excellent mechanical strength and thermal fatigue resistance suitable for electronic assemblies, it would have been obvious to one of ordinary skill in the art to use Sakai's solder in the admitted prior art chip carriers, circuit cards and ball grid arrays because there is an established motivation to find lead-free solders suitable for electronic assemblies and the properties of Sakai's lead-free solder meets the requirements of excellent mechanical strength and thermal fatigue resistance that would be recognized by one of ordinary skill in the art as excellent for lead-free solders for use in electronic assemblies (e.g. the admitted prior art chip carriers, circuit cards and ball grid arrays).

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- Regarding the use of applicant's admitted prior art in the rejection, it is axiomatic that consideration of the prior art cited by the examiner must, of necessity, include consideration of the admitted state of the art found in applicant's specification, *In re Davis*, 305 F.2d 501, 134 USPQ 256 (CCPA 1962); *In re Hedges*, 783 F.2d 1038, 228 USPQ 685 (Fed. Cir. 1986). Admitted knowledge in the prior art may be used in determining patentability of the claimed subject matter, *In re Nomiya*, 509 F.2d 566, 184 USPQ 607 (CCPA 1975).
- 11. Regarding whether the solder composition of Sakai meets the conditions of the claims, Patent and Trademark Office can require applicants to prove that prior art products do not necessarily or inherently possess characteristics of claimed products where claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes; burden of proof is on applicants where rejection based on inherency under 35 U.S.C. § 102 or on prima facie obviousness under 35 U.S.C. § 103, jointly or alternatively, and Patent and Trademark Office's inability to manufacture products or to obtain and compare prior art products evidences fairness of this rejection, *In re Best, Bolton, and Shaw*, 195 USPQ 431 (CCPA 1977).
- 12. Claims 16, 22-24, 26-28, 39, 44, 46, 48-49, 55, 62-64, 67-68 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's disclosure of the prior art in view of Tanaka (Japanese publication 2001-138088).

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- Applicant discloses that chip carriers in the prior art may be coupled to a circuit card by a 13. ball grid array comprising BGA solder balls and that lead-free solders are now beginning to be used commercially. Applicant discloses, however, that the lead-free solders have adverse physical characteristics which may cause reliability problems and that there is a need for a reliable lead-free solder for use in solder ball and chip or chip carrier assemblies (e.g. see applicant's specification page 1, lines 6-14). Therefore, there is established a motivation to find an acceptable and reliable lead-free solder for electronic assemblies in the prior art. To this end, Tanaka discloses a lead-free alloy solder balls containing Sn, 2.6 wt.% Ag and 0.6 wt.% Cu (e.g. see paragraph [0024]) suitable in properties for joining silicon chips and printed circuit boards (e.g. see paragraph [0026]). The silver content in the alloy is low enough to suppress formation of Ag₃Sn plates regardless of the cooling rate. In view of Tanaka's disclosure that his lead-free solder ball composition is suitable for joining chips to printed circuit boards, it would have been obvious to one of ordinary skill in the art to use Tanaka's solder ball compositions in the admitted prior art chip carriers, circuit cards and ball grid arrays because there is an established motivation to find lead-free solders suitable for such electronic assemblies and the properties of Tanaka's lead-free solder balls apparently meets the requirements of lead-free solders for use in electronic assemblies (e.g. the admitted prior art chip carriers, circuit cards and ball grid arrays).
- 14. Regarding the use of applicant's admitted prior art in the rejection, it is axiomatic that consideration of the prior art cited by the examiner must, of necessity, include consideration of the admitted state of the art found in applicant's specification, *In re Davis*, 305 F.2d 501, 134 USPQ 256 (CCPA 1962); *In re Hedges*, 783 F.2d 1038, 228 USPQ 685 (Fed. Cir. 1986).

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Admitted knowledge in the prior art may be used in determining patentability of the claimed subject matter, *In re Nomiya*, 509 F.2d 566, 184 USPQ 607 (CCPA 1975).

15. Regarding whether the solder composition of Tanaka meets the conditions of the claims, Patent and Trademark Office can require applicants to prove that prior art products do not necessarily or inherently possess characteristics of claimed products where claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes; burden of proof is on applicants where rejection based on inherency under 35 U.S.C. § 102 or on prima facie obviousness under 35 U.S.C. § 103, jointly or alternatively, and Patent and Trademark Office's inability to manufacture products or to obtain and compare prior art products evidences fairness of this rejection, *In re Best, Bolton, and Shaw*, 195 USPQ 431 (CCPA 1977).

Conclusion

- 16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additionally cited references serve to further establish the level of ordinary skill in the art at the time the invention was made.
- 17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John J. Zimmerman whose telephone number is (703) 308-2512. The examiner can normally be reached on 8:30am-5:00pm, M-F. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. Any inquiry of

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a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

John J. Zimmerman Primary Examiner

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jjz September 17, 2003